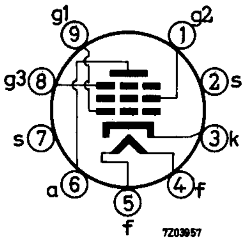
S.Q. TUBE

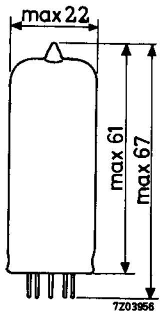
Special quality pentode designed for use as amplifier.

QUICK REFERENCE DATA			
Life test	10 000 hours		
Low interface resistance			
Mechanical quality	Shock and vibration resistant		
Base	Noval. Gold plated pins		
Heating	Indirect A.C. or D.C. Series or parallel supply		
Heater voltage	V_f	6.3	V
Heater current	I_f	300	mA
Anode current	I_a	3	mA
Mutual conductance	S	1.85	mA/V
Equivalent noise resistance (A.F.)	R_{eq}	40	kΩ
Hum voltage	V_{g_1}	max. 5	μV_{RMS}

DIMENSIONS AND CONNECTIONS Dimensions in mm

Base: Noval





CHARACTERISTICS

Column I Nominal value or setting of the tube
II Range values for equipment design: Initial spread
III Range values for equipment design: End of life

		I	II	III	
Heater voltage	V_f	6.3			V
Heater current	I_f	300	285 - 315		mA
Anode voltage	V_a	250			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.2 voltage	V_{g_2}	100			V
Cathode resistor	R_k	550			Ω
Anode current	I_a	3	2.5 - 3.5	min. 2.0	mA
Grid No.2 current	I_{g_2}	0.65	0.45-0.85	min.0.35	mA
Mutual conductance	S	1.85	1.5 - 2.2	min. 1.2	mA/V
Internal resistance	R_i	1.5	min. 1.0		MΩ
Amplification factor grid No.2 to grid No.1	$\mu_{g_2g_1}$	25			
Equivalent noise resistance	R_{eq}		max. 40		kΩ
Frequency 0-10 kHz					
Grid No.1 resistor R_{g_1} = 0 Ω					
Negative grid No.1 current	$-I_{g_1}$		max. 0.1	max. 0.2	μA
Cut off voltage	$-V_{g_1}$	7.5			V
Anode voltage	V_a	250			V
Grid No.3 voltage	V_{g_3}	0			V
Grid No.2 voltage	V_{g_2}	100			V
Anode current	I_a		max. 20		μA
Hum voltage	V_{g_1}		max. 5		μV_{RMS}
Grid resistor R_{g_1} = 1 MΩ					
Cathode resistor bypassed					
Leakage current between cathode and heater			max. 12		μA

Voltage between cathode and heater V_{kf} = 120 V

CAPACITANCES With external shield

		I	II	
Anode to grid No.2, grid No.3, cathode and heater	C_{a/g_2g_3kf}	7.3	6.8-7.8	pF
Grid No.1 to grid No.2, grid No.3, cathode and heater	C_{g_1/g_2g_3kf}	5.0	4.5-5.5	pF
Anode to grid No.1	C_{ag_1}		max. 25	mpF
Grid No.1 to heater	C_{g_1f}		max. 2	mpF
Cathode to heater	C_{kf}	3.7		pF

SHOCK AND VIBRATION RESISTANCE

The following test conditions are applied to assess the mechanical quality of the tube. These conditions are not intended to be used as normal operating conditions.

Shock

The tube is subjected 5 times in each of 4 positions to an acceleration of 500 g supplied by an NRL shock machine with the hammer lifted over an angle of 30°.

Vibration

The tube is subjected during 32 hours in each of 3 positions to a vibration frequency of 50 Hz with an acceleration of 2.5 g.

LIFE

Production samples are tested to be within the end of life values (column III) under the following conditions during 10000 hours.

Anode voltage	V_a	250	V
Grid No.3 voltage	V_{g_3}	0	V
Grid No.2 voltage	V_{g_2}	100	V
Cathode resistor	R_k	550	Ω

LIMITING VALUES (Absolute max. rating system)

Anode voltage	V_{a_o}	max. 600	V
	V_a	max. 300	V
Anode dissipation	W_a	max. 1.3	W
Grid No.2 voltage	$V_{g_{2o}}$	max. 600	V
	V_{g_2}	max. 200	V
Grid No.2 dissipation	W_{g_2}	max. 0.4	W
Negative grid No.3 voltage	$-V_{g_3}$	max. 100	V
Negative grid No.1 voltage	$-V_{g_1}$	max. 100	V
Cathode current	I_k	max. 9	mA
Voltage between cathode and heater			
Cathode positive	V_{kf} (k pos)	max. 120	V
Cathode negative	V_{kf} (k neg)	max. 60	V
Grid No.1 resistor	R_{g_1}	See curve on page G	
Bulb temperature		max. 170	^{o}C

Heater voltage: The average heater voltage should be 6.3 V.
Variations of the heater voltage exceeding the range of 6.0 V to 6.6 V will shorten the tube life.
The tolerance of heater current (column II) should be taken into account.

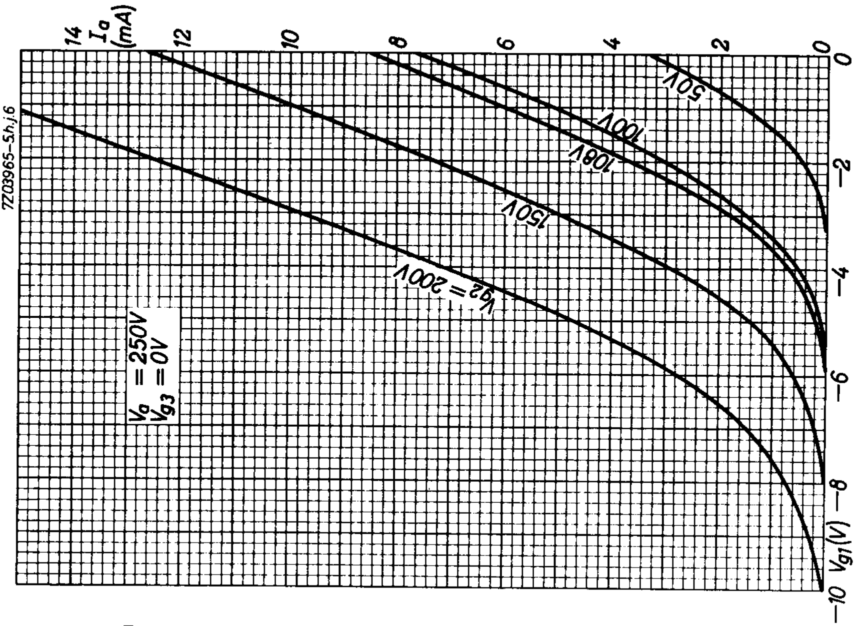
OPERATING CHARACTERISTICS

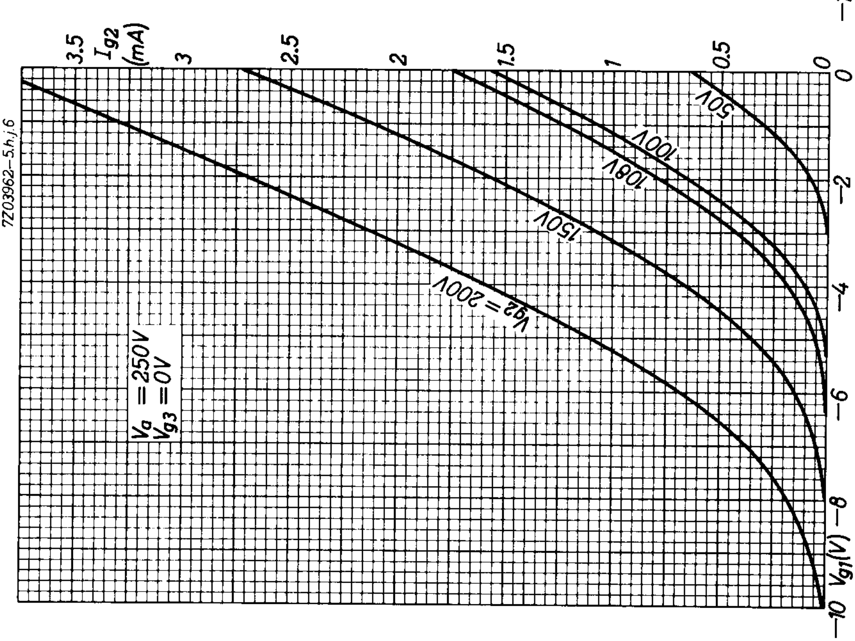
Resistance coupled A.F. amplifier

Anode supply voltage	V_{ba}	100	200	250	300	400	V
Grid No.2 supply voltage	V_{bg_2}	100	200	250	300	400	V
Anode resistor	R_a	0.22	0.22	0.22	0.22	0.22	MΩ
Grid No.2 resistor	R_{g_2}	1.0	1.2	1.2	1.2	1.2	MΩ
Cathode resistor	R_k	3.3	1.8	1.5	1.2	1.0	kΩ
Grid No.1 resistor	R_{g_1}	1	1	1	1	1	MΩ
Grid resistor next stage	$R_{g_1'}$	0.68	0.68	0.68	0.68	0.68	MΩ
Anode current	I_a	0.29	0.61	0.80	0.98	1.37	mA
Grid No.2 current	I_{g_2}	0.07	0.13	0.17	0.20	0.28	mA
Gain	V_o/V_i	120	165	175	190	200	
Output voltage at $+I_g = 0.3\ \mu A$	V_o	8	20	25	30	40	V_{RMS}
Total distortion	d_{tot}	1.7	1.6	1.4	1.1	0.9	%

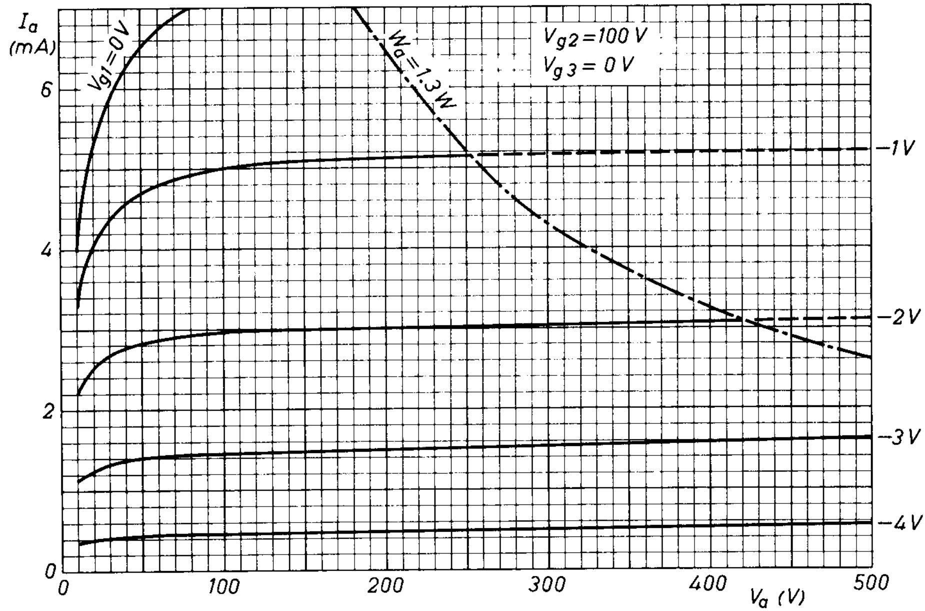
Electrometer pentode

Heater voltage	V_f	4.5	V
Anode voltage	V_a	40	V
Grid No.3 voltage	V_{g_3}	0	V
Grid No.2 voltage	V_{g_2}	40	V
Negative grid No.1 voltage	$-V_{g_1}$	2.15	V
Anode current	I_a	40	μA
Grid No.2 current	I_{g_2}	9	μA
Negative grid No.1 current	$-I_{g_1}$	max. 10^{-10}	A

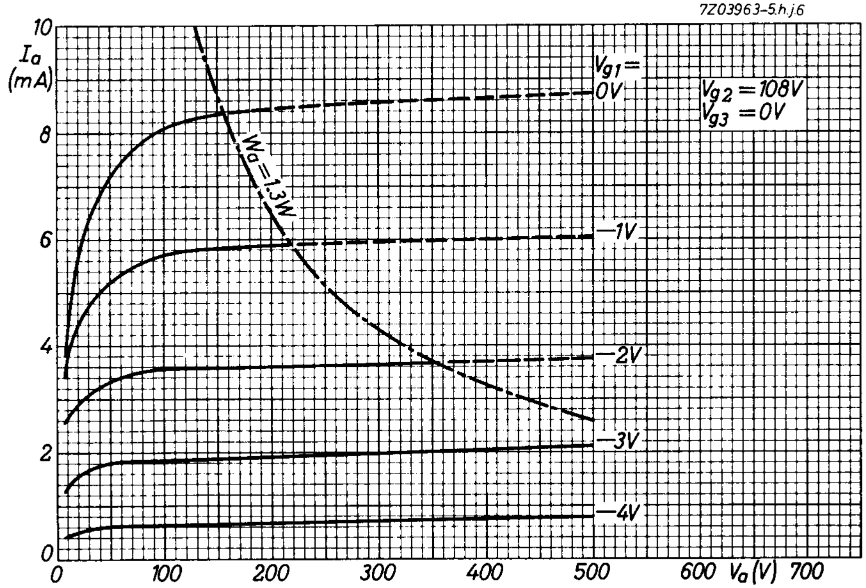

7Z03965-5.h.j.6
I_a (mA)
14
12
10
8
6
4
2
0
0
−2
−4
−6
−8
−10
V_{g1}(V)
V_a = 250V
V_{g3} = 0V
V_{g2} = 200V
150V
108V
100V
50V

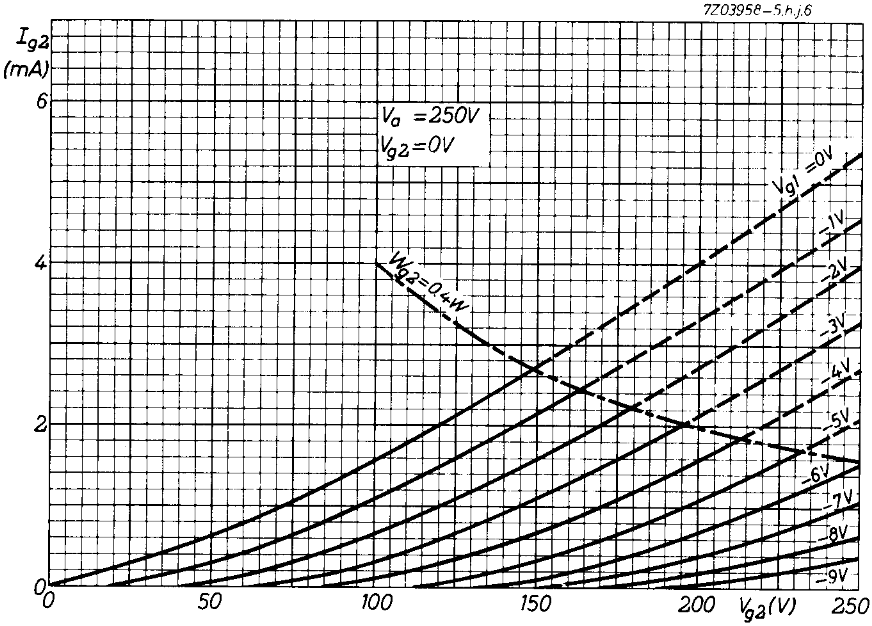

7Z03962-5.h.j.6
I_{g2} (mA)
3.5
3
2.5
2
1.5
1
0.5
0
0
−2
−4
−6
−8
−10
V_{g1}(V)
V_a = 250V
V_{g3} = 0V
V_{g2} = 200V
150V
108V
100V
50V

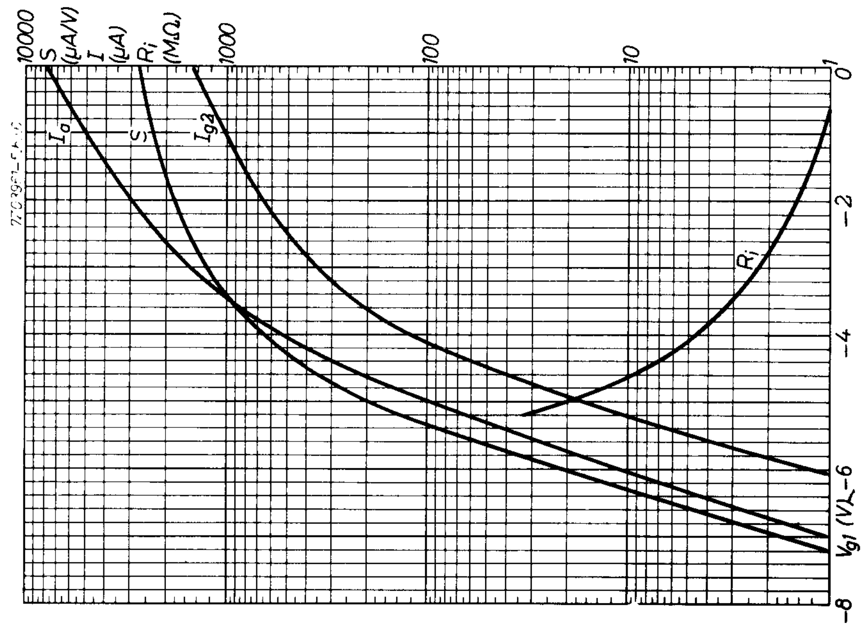
7Z03964-5.h.j.6

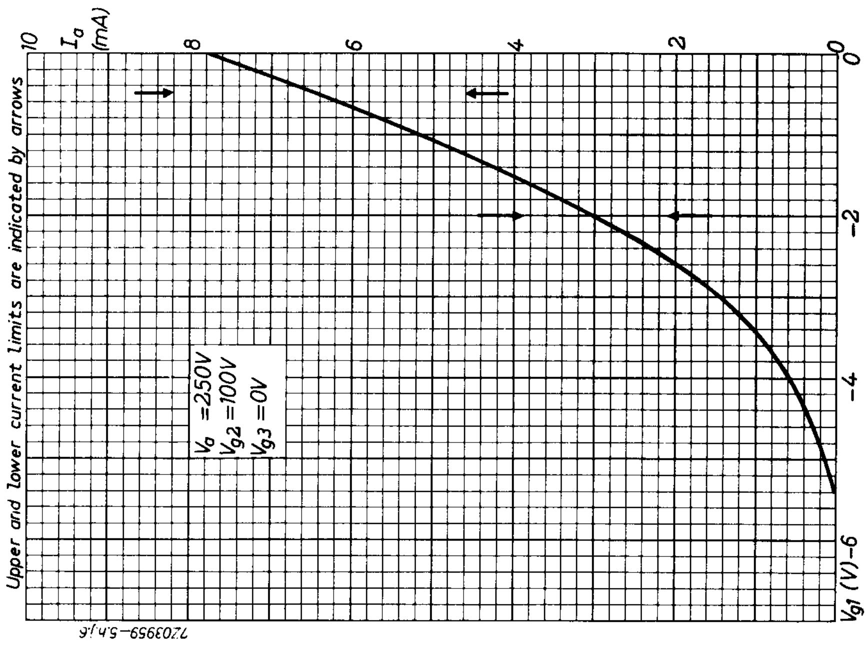


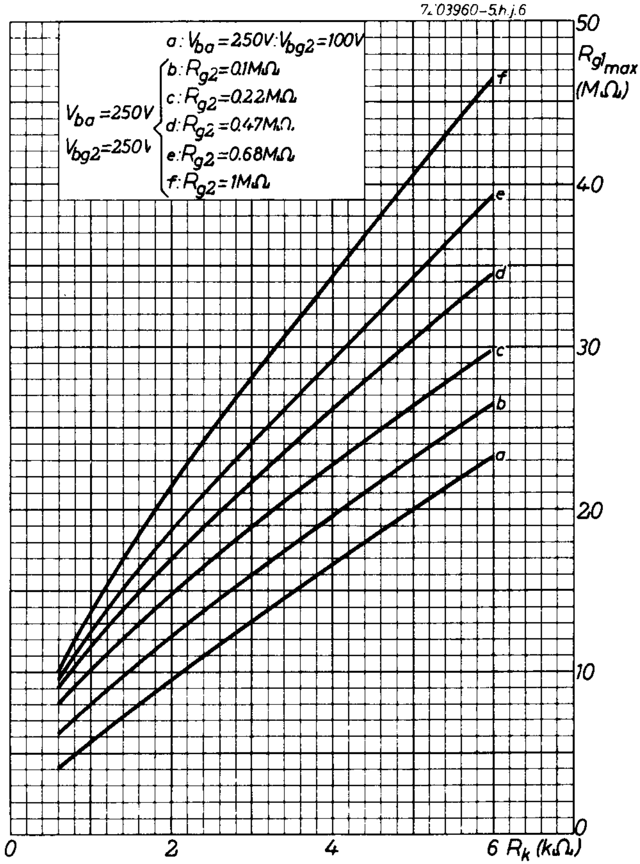
7Z03963-5.h.j.6




7Z03958-5.h.j.6
I_{g2} (mA)
6
4
2
0
V_a = 250V
V_{g3} = 0V
V_{g1} = 0V
-1V
-2V
-3V
-4V
-5V
-6V
-7V
-8V
-9V
W_{g2} = 0.4W
0
50
100
150
200
250
V_{g2} (V)


10000
S (μA/V)
I (μA)
Ri (MΩ)
1000
100
10
1
Ia
S
Ig2
Ri
0
−2
−4
−6
−8
Vg1 (V)


Upper and lower current limits are indicated by arrows
10
Ia (mA)
8
6
4
2
0
Va =250V
Vg2 =100V
Vg3 =0V
0
−2
−4
−6
Vg1 (V)


7Z03960-5.h.j.6
a: V_{ba}=250V; V_{bg2}=100V
V_{ba}=250V
V_{bg2}=250V
b: R_{g2}=0.1MΩ
c: R_{g2}=0.22MΩ
d: R_{g2}=0.47MΩ
e: R_{g2}=0.68MΩ
f: R_{g2}=1MΩ
R_{g1max} (MΩ)
R_k (kΩ)
0
2
4
6
10
20
30
40
50
a
b
c
d
e
f

PHILIPS

Data handbook

Electronic components and materials

E80F

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